

# GRADUATE STUDENT HANDBOOK\*

DEPARTMENT OF MECHANICAL ENGINEERING

University of Idaho  
College of Engineering

\* This information supplements general information in the current University of Idaho Catalog. A summary of University requirements for graduate degrees can be found at <http://www.uidaho.edu/catalog/>.

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## CONTENTS

	Page
Undergraduate Preparation for Graduate Students in Mechanical Engineering .....	1
Graduate Record Examination and GPA .....	3
English Requirements for Students Whose Primary Language is not English.....	4
International Students .....	4
Degree Requirements for M.S. and M.E. Degrees.....	5
Degree Requirements for the Ph.D. Degree .....	7
Graduate Course Offerings.....	8
Procedures for Candidates for M.E. Degree .....	10
Procedures for Candidates for M.S. Degree.....	11
Procedures for Candidates for Ph.D. Degree.....	13
Appendix A. Faculty and Research Areas .....	16
Appendix B. Forms and Handbooks.....	19

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## Undergraduate Preparation for Graduate Students in Mechanical Engineering

Admission to the College of Graduate Studies is open to any student who holds a baccalaureate degree and who presents a scholastic record indicating probable success in graduate work. The General Catalog lists the University's GPA admission requirements. Admission to the Mechanical Engineering Graduate Program is open to any student with the above qualifications if his or her baccalaureate degree is with a major in mechanical engineering from an A.B.E.T. accredited U.S. program.

Students with a B.S. degree from an accredited U.S. engineering program with a major other than mechanical engineering may also be admitted to the Mechanical Engineering Graduate Program. However, such students must demonstrate a basic proficiency in the areas of energy and mechanical systems. This generally requires the student to include courses on the study plan that are assigned as undergraduate deficiencies, in addition to the 30 credits of graduate courses required for the Master's degree. The subjects included in the following list define the areas for which proficiency is expected as an entrance requirement.

a. Mechanical Systems: Statics (Engr 210), Dynamics (Engr 220), and Mechanics of Materials (Engr 350)

b. Energy: Thermodynamics (Engr 320), Fluid Dynamics (Engr 335), and Heat Transfer (ME 345)

Each applicant to the program is evaluated individually which may lead to exceptions and/or substitutions to the above requirements.

Students who do not have a B.S. degree from an accredited U.S. engineering program may also be admitted to the Mechanical Engineering Graduate Program. However, such students must demonstrate a proficiency in the basic subjects included in a B.S.M.E. program. This requires the student to include courses, in addition to the 30 credits of graduate courses required for the Master's degree, which are assigned as a part of the student's study plan as undergraduate deficiencies. The subjects included in the following list define the areas for which proficiency is expected as an entrance requirement.

a. An appropriate combination of mathematics and basic science including multivariable calculus (Math 275), ordinary differential equations (Math 310), probability and statistics (Stat 301), chemistry (Chem 111), and calculus-based physics (Phys 211, 212, 213).

b. Sixteen credits of humanities and social sciences including both breadth and depth.

c. Forty-eight credits of engineering topics which include engineering science and engineering design. Engineering science will include mechanics (Engr 210, Engr 220, Engr 350), thermodynamics (Engr 320), electrical circuits (Engr 240), materials science (MSE 201), and transport phenomena (Engr 335, ME 345). Engineering design must include a meaningful, major engineering design experience that was built upon the fundamental concepts of mathematics, basic science, humanities and social science, engineering topics, and communication skills (a capstone design experience like ME 424/426 is required).

- d. Appropriate laboratory experience such that the student is competent to conduct experimental work. (Laboratory classes are required which include an instrumentation class like ME 330).
- e. Appropriate computer-based experience including computational techniques needed to solve specific engineering problems.
- f. Competence in written and oral English communication. This requires both English composition (e.g., Eng 102) and English technical writing (e.g., Eng 317).
- g. An understanding of the ethical, social, economic, and safety considerations in engineering practice (see engineering design under item c above).
- h. Appropriate classes in the energy stem and the mechanical systems stem of mechanical engineering (included under engineering science in c above).

The evaluation of equivalent classes will be done on an individual basis. If a student does not have the equivalent of one of the above classes (except capstone design), the student may take the class or challenge it (see procedures for challenge in UI General Catalog) after appropriate self-study.

The Mechanical Engineering Department also administers the U. of I. Nuclear Engineering Program, an interdisciplinary graduate program leading to master's and doctoral degrees. The Program is available to students in Idaho Falls, and to a limited extent to students in Moscow and Pocatello, and is taught by faculty with selected nuclear expertise from nuclear, mechanical and chemical engineering, materials science, computer science and chemistry. Program research is closely aligned with U.S. Department of Energy (DOE) missions and enhanced by Idaho Falls-University Place partners: the Idaho National Laboratory (INL)—the nation's leading nuclear laboratory, Idaho State University (ISU), the Center for Advance Energy Studies (CAES) and the Center for Space Nuclear Research (CSNR).

Research activities include next-generation nuclear power sources, nuclear fuels, radioisotope separation processes, high temperature nuclear materials, space nuclear applications, nuclear process heat for hydrogen production, modeling and simulations and nuclear thermal-hydraulics.

The Nuclear Engineering Program is open to any student who holds a baccalaureate degree in Nuclear Engineering, Mechanical Engineering, or Chemical Engineering from an A.B.E.T. accredited school, and has maintained a minimum 3.0 GPA. Students with other undergraduate degrees will be considered on an individual basis.

A limited number of Graduate Research Assistantships (GRAs) are available for highly-qualified students. For additional information about the UI Nuclear Engineering Program, go to this website: <http://www.if.uidaho.edu>, or contact Dr. Fred S. Gunnerson, [gunner@if.uidaho.edu](mailto:gunner@if.uidaho.edu) or Alice Allen, [alicew@uidaho.edu](mailto:alicew@uidaho.edu).

## Graduate Record Examination and GPA

Graduate Record Examination (GRE) test results are recommended but not required for applicants with an engineering baccalaureate degree from a U.S. ABET accredited program. For all other applicants, GRE general test results are required (the engineering subject test is no longer available). These GRE scores and the applicant's grade point average (gpa) aid the faculty in estimating the applicant's scholastic abilities, which are suggestive of probable success in graduate work and are helpful in counseling students in their courses of graduate study. The GRE areas of interest and expected minimum scores are as follows:

Area	Suggested Scaled Score	Engineering Approximate Percentile Rank
Verbal (Reading Comprehension)	470	50th
Quantitative (Basic Math and Problem Solving Skills)	680	50th
Analytical Writing (critical thinking and writing)	4.0	50th

Explanation of the Analytical Writing score:

SCORE 6 - a cogent, well-articulated analysis of the complexities of the issue and conveys meaning skillfully.

SCORE 5 - presents a generally thoughtful, well-developed analysis of the complexities of the issue and conveys meaning clearly.

SCORE 4 - presents a competent analysis of the issue and conveys meaning adequately.

SCORE 3 - demonstrates some competence in its analysis of the issue and in conveying meaning but is obviously flawed.

SCORE 2 - paper demonstrates serious weaknesses in analytical writing.

SCORE 1 - demonstrates fundamental deficiencies in analytical writing skills.

SCORE 0 - off topic, in a foreign language, merely copies the topic, consists of only keystroke characters, or is illegible, blank, or nonverbal.

## English Requirements for Students Whose Primary Language is NOT English

The results of the Test of English as a Foreign Language (TOEFL) are required for all students whose primary language is not English and are used as a measure of the student's skills in these areas:

Area	Paper Based Minimum Score	Internet Based Minimum Score
Listening	54	21
Structure/Writing	54	21
Reading	54	21
Speaking	NA	21
Total	550	79

A part of the TOEFL paper-based test also reports an essay rating, the Test of Written English (TWE). This writing test provides information about an examinee's ability to generate and organize ideas on paper, support those ideas with evidence or examples, and use the conventions of standard written English. A minimum 70<sup>th</sup> percentile score of 4.2 is recommended. Explanation of the scores follows:

- 6 Effectively addresses the writing task, is well organized and well developed, uses clearly appropriate details to support a thesis or illustrate ideas, displays consistent facility in the use of language, demonstrates syntactic variety and appropriate word choice.
- 5 May address some parts of the task more effectively than others, is generally well organized and developed, uses details to support or illustrate an idea, displays facility in the use of the language, demonstrates some syntactic variety and range of vocabulary.
- 4 May address some parts of the task more effectively than others, is generally well organized and developed, uses details to support a thesis or illustrate an idea, displays facility in the use of the language, demonstrates some syntactic variety and range of vocabulary.
- 3 Inadequate organization or development, inappropriate or insufficient details to support or illustrate generalizations, a noticeably inappropriate choice of words or word forms, an accumulation of errors in sentence structure and/or usage
- 2 Serious disorganization or underdevelopment, little or no detail or irrelevant specifics, serious and frequent errors in sentence structure or usage, serious problems with focus.
- 1 May be incoherent, undeveloped, and may contain severe and persistent writing errors.

### International Students

International students must carry nine (9) credit hours per semester to be in compliance with the rules and regulations of the U.S. Immigration Service. Exceptions to this requirement permitted by the Immigration Service are:

1. when a student is in his/her final semester and does not need full credit to graduate;
2. for medical reasons, which requires verification from a doctor;
3. for graduate students who have completed all course work and have only thesis or dissertation work remaining.

## Degree Requirements for M.S. and M.E. Degrees

Thirty credits are required for the M.S. and M.E. degrees in Mechanical Engineering. At least 18 credits (including thesis for M.S.) must be at the 500 level. No credits may be at the 300 level or lower. In addition, no classes required in our B.S.M.E. curriculum can be used as part of the graduate program. This restriction does not include technical elective classes.

At least three classes that consist primarily of subject material focused in mechanical engineering at the 500 level are required. MEME students must take at least two additional mechanical engineering classes in lieu of thesis/research. Mechanical engineering classes are offered in the following areas:

mechanics and materials science  
dynamic systems  
thermodynamics and energy

design and manufacturing  
fluids and heat transfer

Available classes are listed on the M.E. Plan for Schedule of Course Offerings.

Courses that satisfy the M.E. mathematics requirement include:

- ME 541 Mechanical Engineering Analysis
- ME 544 Conduction Heat Transfer
- ME 545 Numerical Heat Conduction
- any 400 or higher-level course in mathematics, numerical methods or statistics. This class cannot be a duplication of material covered in the required B.S.M.E. curriculum (such as the numerical methods taught in ME 123/223 or the statistics taught in Stat 301).

One class is required that focuses on the model/equation formulation (not solution) in energy and mechanical system stems. ME 540 Continuum Mechanics is the only class that will presently satisfy this requirement.

The combined total of transfer credits, correspondence credits, non-degree credits, and approved credits more than eight years old at the time the degree is awarded shall not exceed 12 credits for master's programs requiring 36 or fewer credits.

Credits earned at an institution that does not grant graduate degrees cannot be transferred to the UI for graduate credit.

All other credits submitted to meet the requirements for a Master's degree must have been earned within the eight consecutive years immediately preceding the academic session in which the degree is completed. The required course distributions for the two degrees follow.

**M.S.M.E. DEGREE**  
(Available only in Moscow, IFCHE, and Boise)

<u>Course Area</u>	<u>Credits</u>
Mathematics/statistics/numerical methods	3
Continuum Mechanics	3
Mechanical Engineering Technical Electives	9
Other technical electives in Mechanical Engineering or from other appropriate departments as approved by supervisory committee and department chairman	6 – 9
Research and Thesis	6 - 9
<b>TOTAL</b>	<b>30</b>

Final Defense and Comprehensive Exam: One hour presentation and defense of thesis followed after a break by a one hour oral exam. A written examination on course work will be given at a later date if necessary.

**M.E.M.E. DEGREE**

<u>Course Area</u>	<u>Credits</u>
Mathematics/Statistics/Numerical Methods	3
Continuum Mechanics	3
Mechanical Engineering Technical Electives	15
Electives - Mechanical Engineering or Other Appropriate Departments As Approved by Supervisory Committee and Department Chairman	9
<b>TOTAL</b>	<b>30</b>

Completion: Upon completion of all course work, the student will choose one of the options found on pages 10-11.

Note: Research credits will not count toward the MEME degree.

## Degree Requirements for the Ph.D. Degree

The applicant must satisfy our requirements for the M.E.M.E. or M.S.M.E. degree. The additional details of the individual program for the doctoral degree is established by the supervisory committee in consultation with the student. General university guidelines require:

1. A minimum of 78 credits beyond the bachelor's degree;
2. At least 52 credits in courses numbered 500 and above;
3. At least 39 of the 78 credits must be in courses other than Doctoral Research and Dissertation.
4. At least 39 of the 78 required credits must be UI courses.

The Department of Mechanical Engineering requires that at least one-third of the credits beyond the bachelor's degree be in research (26 credits).

Two examples of the requirements are given below. One example assumes the student completed a master's thesis and the other assumes the student did not.

### With Master's Thesis

24 credits M.S. course work  
24 credits Ph.D. course work  
Total 48 credits course work

6 credits MS research & thesis  
24 credits Ph.D. research & dissertation  
Total 30 credits research

Total 78 credits

### Without Master's Thesis

30 credits M.S. course work  
21 credits Ph.D. course work  
Total 51 credits course work

Total 27 credits Ph.D. research & dissertation

Total 78 credits

Of the total course work, at least one-half of the credits beyond the bachelor's degree must be in M.E. courses. Of the 78 credits submitted to satisfy the degree requirements, a maximum of 30 credits may be more than eight (8) years old when the degree is conferred, provided the supervisory committee determines that the student has kept current in the subjects. All other degree requirements must be completed no later than five (5) years after the date on which the candidate passed his/her preliminary examination.

## Graduate Course Offerings

The Departments at the University of Idaho (UI) and Washington State University (WSU) support each other's graduate programs. Graduate students register at their own institution to take classes at the other institution. The following table outlines the planned Mechanical Engineering course offerings at the UI. This plan may change.

Class	Co-op	F08	S09	F09	S10	F10	S11	F11	S12	F12	
<b><i>Mechanics and Materials Science</i></b>											
ME 415 Materials Selection and Design (MET 415)			X		X		X		X		
ME 425 Advanced Machine Design				X			X				
ME 461V Fracture Mechanics			X		X		X		X		
ME 473 Experimental Stress Analysis											
ME 508V Mechanics of Plates and Shells					X		X				
ME 534V Mech. of Composite Materials (MSE 536)	Y		X			X				X	
ME 539 Advanced Mechanics of Materials (MSE 539)				X		X		X		X	
ME 548V Elasticity (CE 548)							X				
ME 549V Finite Element Analysis (CE 546)		X			X		X		X		
ME 573 Acoustic Waves in Elastic Solids											
<b><i>Dynamic Systems</i></b>											
ME 413/513V Engineering Acoustics (ECE 579)	Y		X		X		X		X		
ME 472 Mechanical Vibrations	Y										
ME 481 - Control Systems (ECE470)	Y	X		X		X		X		X	
ME 542 Optimal Control	Y										
ME 572 Advanced Vibrations (ECE 575)	Y										
ME 575 Optimal Control Theory (ECE 574)	Y	Taught at WSU, schedule unknown									
ME 4/576 Robotics		X		X		X		X		X	
ME 578V Neural Network Design (ECE 578)			X		X		X		X		
ME 580V Linear System Theory (ECE 572)		X				X					
ME 581V Fuzzy Logic Control Systems (ECE 573)				X				X			
ME 582 Adv Topics in Control Systems (ECE 577)					X		X				
<b><i>Fluid Mechanics and Heat Transfer</i></b>											
ME 412V Gas Dynamics		X		X		X		X		X	
ME 515 Transport Phenomena (ChE 515)											
ME 417/517V Turbomachinery			X		X	X		X		X	
ME 519V Fluid Transients (CE519)					X						
ME 420/520V Fluid Dynamics (CE 4/520)*			X		X	X				X	
ME 545 Numerical Heat Conduction											
ME 546V Convective Heat Transfer*	Y			X			X			X	
ME 547V Thermal Radiation Processes*	Y				X				X		
ME 4/551 Exper. Meth. Fl Dyn. & Heat Transfer					X*						
<b><i>Thermodynamics and Energy</i></b>											
ME 414/514V HVAC Systems		X			X			X			
ME 422V Applied Thermodynamics					X			X			
ME 433 Combustion Engine Systems		Su8									
ME 443V Thermodynamic Topics—Solar						X				X	
ME 443V Thermodynamic Topics—Refrigeration		X		X							
ME 443V Thermodynamic Topics—Other			X								
ME 444 - Air Conditioning Engineering*	Y		X				X			X	
ME 526V Statistical Thermodynamics	Y						X				
ME 527 Advanced Thermodynamics	Y										

	Co-op	F08	S09	F09	S10	F10	S11	F11	S12	F12
<b>Computational Design and Simulation</b>										
ME4/518 Discrete Simulation										
ME 4/521 Advanced Computer-Aided Design		X	X	X	X	X	X	X	X	X
ME 4/528 Computer-Aided Simulation										
<b>Manufacturing and Engineering Management</b>										
ME 410 Lean Manufacturing		Su08		Su09		Su10		Su11		Su12
ME 4/577 Design for Manufacture and Assembly			X		X		X		X	
ME 583V Reliability of Engr Systems (CE 541)			X				X			
ME 585 Design for Six Sigma						X				
ME 587V Quality Engineering (EM 587)					X				X	
EM 504 Lean Management		X		X			X			
EM 510 Engr Management Fundamentals		X		X		X		X		X
EM 599 Engineering Management Project		X	X	X	X	X	X	X	X	X
<b>Other Classes</b>										
ME 529V Air Pollution*				X			X			
ME 540V Continuum Mechanics (CE 540)			X		X		X		X	
ME 541 Mechanical Engineering Analysis		X		X		X		X		X
<b>NEW COURSES</b>										
ME 4/5XX Technical Venture Creation			X		X					
ME 5XX Plasticity										
ME 4XX Mechatronics			X		X		X			
ME 4XX Explosives		X								
ME 4XX Computational Synthesis		X	X					X		
ME 4XX Interdisciplinary Production				X	X					
ME 4XX Artificial Intelligence in Engineering						X				
<b>Nuclear Engineering</b>										
NE 450 Fundamentals of Nuclear Engineering		X		X		X		X		
ME 502 Intermediate Nuclear Engineering			X		X		X		X	
<i>Other courses offered on IFCHE campus only</i>										

PLEASE PAY ATTENTION TO THIS LEGEND:

\*TAUGHT IN BOISE

BLANK LINE AFTER COURSE NUMBER AND NAME INDICATES IT IS NOT BEING TAUGHT

X INDICATES COURSE IS OFFERED BY MECHANICAL ENGINEERING

CS INDICATES COURSE IS TAUGHT BY COMPUTER SCIENCE

CE INDICATES COURSE IS TAUGHT BY CIVIL ENGINEERING

ECE INDICATES COURSE IS TAUGHT BY ELECTRICAL AND COMPUTER ENGINEERING

V INDICATES COURSE IS VIA VIDEO AND IS AVAILABLE THROUGH ENGINEERING OUTREACH

## Procedures for Candidates for M.E. Degrees

1. Upon application, a student accepted for the degree will be notified of any undergraduate course deficiencies which must be fulfilled.
2. Nomination of Major Professor: The student, department chair, and potential major professor must concur on the nomination of the major professor before the student has completed three classes. The nominated major professor in conjunction with the student must submit the Appointment of Major Professor and/or Committee form to the Mechanical Engineering office, to be sent to the College of Graduate Studies.
3. Supervisory Committee: A supervisory committee is not required for the MEME degree.
4. Study Plan: The Study Plan, filled out by the student in consultation with the major professor, must be prepared by the time three classes are completed. Only those courses needed to complete the degree are on the plan. After approval by the department chair, the plan is sent to the College of Graduate Studies. Awarding of the degree is contingent upon completion of the Study Plan.
5. Completion: Upon completion of all course work, the student will choose one of these options:
  - A. An oral (PowerPoint) presentation of 20-25 minutes, given on campus to a committee of three professors who taught courses relevant to the topic. The presentation will be followed by a question/answer period for a total of about one hour duration.
  - B. An oral (PowerPoint) presentation of 20-25 minutes submitted electronically. Three professors who taught courses relevant to the topic will view the presentation, and then take part in a conference call to allow questions, comments, etc. between the committee and the student.
  - C. A paper of no less than five pages of single spaced text in a 12-point font (inclusion of figures, equations, tables, and references is encouraged but does not contribute to the page count) will be sent and reviewed by a committee of three professors who taught classes relevant to the topic. This will be followed by a conference call to allow questions, comments, etc., between committee and student.

The topic of the presentation or paper will be of the student's choosing and should

- A. expand on a project or problem from a class or classes required for the degree, or
- B. describe a project from the student's profession that used knowledge gained from a class or classes required for the degree, and
- C. be approved by the student's major professor.

A one-hour follow-up examination may be required.

## Guidelines:

- A. Presentation time: 20 to 25 minutes (similar to most technical conference presentations), hence 20 to 25 PowerPoint slides.
  - B. Paper length: five pages minimum, single spaced.
  - C. Total duration: reserve one hour block for conference call; reserve two hours for on-campus visit because the presentation time is included.
  - D. Examination committee: three faculty who taught classes relevant to the presentation/paper.
  - E. The Non-Thesis Requirement Report Form, available on the COGS website under FORMS, must be completed by the major professor and delivered to COGS.
  - F. The student must be enrolled in the university the semester that she/he completes the final presentation/paper, either in a class or for ME 502 DS: Comprehensive Exam.
6. Remember to fill out your application for advanced degree when you are within one semester of completing your requirements. You can find the form on the Registrar's website at <http://www.registrar.uidaho.edu/graduation/apply-to-graduate>.

Further information on university and general regulations may be obtained from the University of Idaho College of Graduate Studies at [www.uidaho.edu/cogs/](http://www.uidaho.edu/cogs/) and the registrar at [www.uidaho.edu/registrar/forms.html](http://www.uidaho.edu/registrar/forms.html) (Appendix B).

## Procedures for Candidates for M.S. Degree

1. Upon application, a student accepted for the degree will be notified of any undergraduate course deficiencies which must be fulfilled. Students should review the faculty research areas table (Appendix A) and contact faculty with mutual research interests.
2. Major Professor: The student, department chair and potential major professor must concur on the nomination of the major professor before three classes are completed. The major professor and student then submit a completed Appointment of Major Professor and/or Committee form to the Mechanical Engineering office to be sent to the College of Graduate Studies.
3. Committee: The supervisory committee will be nominated by the major professor consulting with the student and the department chair. The committee must include:
  - A. the major professor as chair
  - B. an additional member from the Mechanical Engineering Department;
  - C. one member from another department.

Additional members may be appointed if desired. All committee members must be UI faculty or UI affiliate faculty members. At least fifty percent (50%) of the committee members must be graduate faculty.

4. **Study Plan**: The Study Plan, filled out by the student in consultation with the major professor, **must be prepared by the time three classes are completed**. Only those courses needed to complete the degree are on the plan. After approval by supervisory committee members and the department chair, the plan will be sent to the College of Graduate Studies. Awarding of the degree is contingent upon completion of the Study Plan.
5. **Final Comprehensive Exam**: The final comprehensive examination is scheduled and administered by the major professor. All supervisory committee members must be present at this examination. An announcement of the defense, usually the abstract, needs to be prepared and posted several days before the defense. This announcement includes the title and abstract, presenter, day, time, and location.

In the first hour of the exam the student will present his/her thesis. Following a ten-minute break, an oral examination will be given on course work and/or matters related to the thesis. At the completion of this oral examination, it will be decided if an additional written examination will be required at a later date.

The **Request to Proceed to Final Defense** form must be submitted to the College of Graduate Studies before the defense. The student will receive from COGS the **Report of Final Defense** form which must be signed by the student's committee after the defense, and submitted to the College of Graduate Studies by the major professor.

A copy of the title page of the thesis must be attached to the Report of Final Defense form, and the completed thesis submitted within six months of the final defense.

6. **Submission of the Thesis**: Complete instructions for format and submission are found in the Graduate Handbook for Theses and Dissertations ([www.uidaho.edu/cogs/](http://www.uidaho.edu/cogs/)). It is important to follow the instructions to the letter.

In addition to the two copies of the thesis required by the College of Graduate Studies, one unbound copy with a completed signature page is required by the Mechanical Engineering Department. It is wise to have extra signature pages completed.

If you desire a bound copy of your thesis for yourself or your major professor, be sure to make arrangements with the ME office staff or with UI Printing and Design.

7. The **Application for Advanced Degree** form, found on the Registrar website at <http://www.students.uidaho.edu/default.aspx?pid=19797> should be completed on-line when you are within one semester of completing your requirements.

Further information on university and general regulations, including required forms and Graduate Handbook for Theses and Dissertations, is available from the University of Idaho College of Graduate Studies at [www.uidaho.edu/cogs/](http://www.uidaho.edu/cogs/) and the Registrar at [www.uidaho.edu/registrar/forms.html](http://www.uidaho.edu/registrar/forms.html) (Appendix B).

## Procedures for Candidates for Ph.D. Degree

1. Upon application, a student accepted for the degree will be notified of any undergraduate course deficiencies which must be fulfilled.
2. **Major Professor:** The faculty research areas table (Appendix A) at the end of this handbook will help the student choose a major professor. The student, department chair and potential major professor must concur on the nomination before three courses have been completed. The major professor and student then submit the Appointment of Major Professor and/or Committee form to the Mechanical Engineering (ME) office, to be sent to the College of Graduate Studies.
3. **Qualifying Examination:** The Ph.D. qualifying examination, administered within the first year and before completion of the bulk of course work, is designed to evaluate preparation for doctoral course work and provide guidance in planning the Ph.D. program. The examination consists of a two-hour oral in specified subject areas at the advanced undergraduate level, possibly followed by a written exam in the same subject areas. Areas of expected qualification are:
  - a. Energy and Energy Design - Thermodynamics, Heat Transfer, Fluid Mechanics, and Energy Design. (Course preparation: \* Engr 320, ME 345, and Engr 335 or equivalent)
  - b. Applied Mechanics and Mechanical Design - Statics, Dynamics, Mechanics of Materials and Machine Design. (Course preparation: \* Engr 210, Engr 220, Engr 350 and ME 425 or equivalent)
  - c. Mathematics, numerical methods and programming. (Course preparation: \* Math 310, ME 123/223 and additional computer and mathematics experience)

In lieu of the foreign language proficiency requirement, the ME department asks for demonstrated proficiency in numerical methods and computer programming. This requirement may be satisfied by successful completion of courses, or other evidence of proficiency.

The department chair in consultation with the major professor will appoint examiner(s) in each area. The student may, at the discretion of the examining committee, be exempted from the written part of the exam because of exemplary performance on the oral portion.

Dates for the oral examination are to be arranged with personnel in the Mechanical Engineering Department office.

Results of the examination must be communicated to the department chair in a memo from the committee chair. The memo will be put into the student's file.

\*Course numbers shown are from the current University of Idaho General Catalog.

4. **Study Plan**: The Study Plan, filled out by the student in consultation with the major professor must be prepared and approved soon after completion of the qualifying examination. After the plan is signed it should be taken to the ME office from which it will be sent to the College of Graduate Studies. Awarding of the degree is contingent upon completion of the Study Plan.

The study plan is just a plan; courses can be dropped and added on a Change of Study Plan form at any time. The form must be signed and submitted to the ME office to be sent to the College of Graduate Studies.

5. **Committee**: A supervisory committee will be nominated by the major professor consulting with the student and the department chair. The committee must include:
  - a. the major professor, a full member of the UI graduate faculty, as chair;
  - b. an additional member from the major field;
  - c. one member from a supporting field;
  - d. one member from outside the major field.

All of these must be UI faculty or affiliate faculty members. Additional members may be appointed if needed. At least fifty percent (50%) of the committee must be members of the graduate faculty.

6. **Preliminary Examination**: When a majority of the course requirements on the study plan have been completed, a preliminary exam, written and oral, will be given under direction of the student's major professor. The purpose of this exam is to ensure that the student adequately reviews and integrates completed course work, and has the necessary technical knowledge upon which to base the doctoral research. Students are encouraged to seek additional direction from their graduate committee on preparation for the exam.

The student will be expected to complete an eight-hour written examination on graduate-level concepts in either open or closed book form at the discretion of the supervisory committee. This examination is usually scheduled in two four-hour sessions on successive days.

A two-hour oral examination will follow the written examination at a later date. Broad areas to be covered are those listed in the study plan. Upon successful completion of the exam, the student is advanced to candidacy.

**Dissertation Proposal**: The examination includes presentation of a written dissertation proposal and/or progress report to the supervisory committee. Committee members will sign and date the front page of the proposal, indicating acceptance.

**Report of Preliminary Examination and Advancement to Candidacy form**: Obtained from the COGS website (<http://www.grad.uidaho.edu/default.aspx?pid=32490>), this form must be filled out and submitted to the College of Graduate Studies on completion of the exam and presentation.

7. **Final Ph.D. Examination:** Administered by the major professor, this examination may be taken no earlier than five months after advancement to candidacy. Ten days prior to the examination, a near-final copy of the dissertation must be submitted to supervisory committee members, all of whom must be present at the examination.
8. **Request to Proceed with Final Defense of Dissertation/Thesis Form:** The completed form (obtained from the COGS website, above) must be submitted to the College of Graduate Studies at the beginning of the semester in which the student intends to graduate.

The student will receive from the College of Graduate Studies the Final Defense Report form that must be signed by the student's committee after the defense, and submitted to the College of Graduate Studies by the major professor.

9. **Doctoral Dissertation Defense:** At the conclusion of the candidate's research project, a date is arranged with the supervisory committee for the student to defend his/her dissertation. Two weeks before the chosen date, the dissertation defense must be announced on a simple poster with the candidate's name and that of the major professor; the date, time and location of the defense; the dissertation topic and a short narrative of the subject matter.

A draft of the dissertation is submitted to members of the supervisory committee at least one week prior to the date of the defense. The defense consists of a one-hour presentation followed by 30 minutes of questions. After deliberation, the supervisory committee may require further research or edits to the dissertation.

10. **Submitting the final dissertation:** Complete instructions for format and submission are found in the Graduate Handbook for Theses and Dissertations. It is important to follow the instructions to the letter.

In addition to the two copies of the dissertation required by the College of Graduate Studies, one unbound copy with a completed signature page is required by the Mechanical Engineering Department. It is wise to have extra signature pages completed.

If you wish to have a bound copy, be sure to make arrangements with ME office staff or with UI Printing and Design.

Further information on university and general regulations, the Graduate Handbook for Theses and Dissertations, and necessary forms are on the University of Idaho College of Graduate Studies website at [www.uidaho.edu/cogs/](http://www.uidaho.edu/cogs/).

## Appendix A. Faculty Research Areas Mechanical Engineering Department

### Moscow Faculty

Michael J. Anderson, Ph.D., P.E., Professor

Acoustics in fluids and solids; transducer design.

[anderson@uidaho.edu](mailto:anderson@uidaho.edu);

homepage <http://calvin.engr.uidaho.edu/~anderson/mikea.htm>

Steven W. Beyerlein, Ph.D., Professor

Catalytic ignition systems for spark-ignition and compression-ignition engines. Engine testing. Design and delivery of faculty development activities. Application of educational research methods in engineering courses.

[sbeyer@uidaho.edu](mailto:sbeyer@uidaho.edu);

homepage [http://222.uidaho.edu/engr/ME/faculty/s\\_beyerlein.htm](http://222.uidaho.edu/engr/ME/faculty/s_beyerlein.htm)

Karen R. Den Braven, Ph.D., Professor and Department Chair

Design and installation of geothermal or ground-coupled heat pump systems; alternative snowmobile design.

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Donald F. Elger, Ph.D., P.E., Professor

Heat transfer; fluid mechanics; methodologies for engineering problem-solving and design.

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Jay P. McCormack, Ph.D., Assistant Professor

Design methodology, computational design, entrepreneurship, artificial intelligence, optimization.

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Edwin M. Odom, Ph.D., P.E., Associate Professor

Applied mechanics and manufacturing; experimental stress analysis; TQM.

[eodom@uidaho.edu](mailto:eodom@uidaho.edu)

Steven G. Penoncello, Ph.D., P.E., Professor

Thermophysical properties of fluids and fluid mixtures, determination of equations of state for fluids and fluid mixtures of engineering interest.

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Gabriel Potirniche, Ph.D., Assistant Professor

Multiscale modeling of plasticity and damage behavior in metals, fatigue and fracture, constitutive modeling for metallic alloys, atomistic simulations, crystal plasticity, anisotropic plasticity, finite element method, solid mechanics, stress analysis.

[gabrielp@uidaho.edu](mailto:gabrielp@uidaho.edu)

**Karl K. Rink, Ph.D., Assistant Professor**

Combustion, gas dynamic and thermodynamic research with emphasis in rapid detonations, confined explosions, and energetic materials; combustion component design in propulsion systems including gas turbines and rockets; leak rate determination in small cavity devices.  
karlrink@uidaho.edu

**Robert R. Stephens, Ph.D., P.E., Professor**

Materials properties measurements and modeling; failure analysis, fatigue and fracture.  
bstephen@uidaho.edu;  
homepage [http://www.uidaho.edu/engr/ME/faculty/r\\_stephens.htm](http://www.uidaho.edu/engr/ME/faculty/r_stephens.htm)

**Eric T. Wolbrecht, Ph.D., Assistant Professor**

Robotics, non-linear control, adaptive control, rehabilitation robotics, pneumatic control, and compliant actuation.  
ewolbrec@uidaho.edu

### Boise Faculty

**Ralph S. Budwig, Ph.D., P.E., Professor**

Fluid dynamics and turbulent transport; optical measurement techniques; cardiovascular fluid dynamics; hydrodynamic and acoustic manipulation of particles and droplets; laboratory and design pedagogy.  
rbudwig@uidaho.edu; homepage [http://www.webs1.uidaho.edu/ralph\\_budwig/](http://www.webs1.uidaho.edu/ralph_budwig/)

**Larry A. Stauffer, Ph.D., P.E., Professor**

Engineering design, specifically design theory and design methods dealing with product planning, specifications, ergonomics, safety and production; process design, layout, and simulation.  
stauffer@uidaho.edu

**Judi A. Steciak, Ph.D., P.E., Associate Professor**

Applied combustion research, especially reducing air pollutants released from combustion systems, including pollutants created from fossil fuels, renewable transportation fuels, and biomass, and contaminants released from unwanted fires caused by industrial accidents.  
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## Idaho Falls Faculty

**John C. Crepeau, Ph.D., P.E. Associate Professor**

Solidification of materials with internal heat generation; transition to turbulence in fluid flow and fluid stability; flow visualization; high temperature thermocouple measurements.

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**Fred S. Gunnerson, Ph.D., P.E., Professor**

Nuclear energy, renewable energy, turbomachinery, fire dynamics, laboratory simulation of thermofluid systems.

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**Akira T. Tokuhira, Ph.D., Associate Professor**

Nuclear reactor engineering, nuclear systems design, reactor safety, thermohydraulics, thermal fluid sciences, experiments, ultrasonic and particle image velocimetry, computational fluid dynamics, convective heat transfer, measurement methods, modeling of complex processes, applied facial and voice biometrics and assistive technology robotics, human factors, technology assessment and policy.

tokuhira@uidaho.edu

## Appendix B. Forms and Handbooks

Form/Handbook	Degree	Where Available
Appointment of Major Professor and/or Committee	ME, MS, PhD	<a href="http://www.grad.uidaho.edu">www.grad.uidaho.edu</a>
Study Plan, Change of Study Plan, Change of Curriculum	ME, MS, PhD	<a href="http://www.grad.uidaho.edu">www.grad.uidaho.edu</a>
Application for Advanced Degree	ME, MS, PhD	<a href="http://www.uidaho.edu/registrar">www.uidaho.edu/registrar</a> complete the application online
Add/Drop Form	ME, MS, PhD	<a href="http://www.uidaho.edu/registrar">www.uidaho.edu/registrar</a>
Non-Thesis Requirement Report	ME	<a href="http://www.grad.uidaho.edu">www.grad.uidaho.edu</a>
Qualifying Examination Result Memo	PhD	Written by the chair of the examination committee and sent to the department chair.
Report of Preliminary Examination and Advancement to Candidacy	PhD	<a href="http://www.grad.uidaho.edu">www.grad.uidaho.edu</a>
Request to Proceed to Final Defense	MS, PhD	<a href="http://www.grad.uidaho.edu">www.grad.uidaho.edu</a>
Report of Final Defense	MS, PhD	College of Graduate Studies (208) 885-6243 <a href="mailto:uigrad@uidaho.edu">uigrad@uidaho.edu</a>
Graduate Handbook for Theses and Dissertations	MS, PhD	<a href="http://www.grad.uidaho.edu">www.grad.uidaho.edu</a>
College of Graduate Studies Bulletin	ME, MS, PhD	College of Graduate Studies (208) 885-6243 <a href="mailto:uigrad@uidaho.edu">uigrad@uidaho.edu</a>